

Claims

[c1] What is claimed is:

1. An automatic gain control method used in a wireless receiver, the wireless receiver being for receiving a plurality of signal blocks sent by a wireless transmitter, each of the plurality of signal blocks comprising at least one frame, the wireless transmitter having a discontinuous transmission mode, the method comprising:
receiving a first frame, amplifying a RF signal corresponding to the first frame with a gain value and down converting the RF signal to generate a baseband signal;
updating the gain value according to the power level of the baseband signal corresponding to the first frame, wherein the updated gain value is for amplifying the RF signal corresponding to a second frame when receiving the second frame;
determining whether a first signal block is in the discontinuous transmission mode or not, wherein the first frame belongs to the first signal block; and
resuming the gain value according to the power level of the baseband signal corresponding to a third frame if the first signal block is in the discontinuous transmission mode;

wherein the third frame belongs to a third signal block which is sent before the first signal block and the third signal block is not in the discontinuous transmission mode.

- [c2] 2. The automatic gain control method of claim 1, wherein:
 - the wireless transmitter transmits the RF signal in a frequency hopping manner; and
 - the first frame, the second frame, and the third frame correspond to the same channel frequency.
- [c3] 3. The automatic gain control method of claim 1, wherein:
 - the wireless transmitter transmits the RF signal with a single channel frequency;
 - the second frame is the one sent immediately after the first frame; and
 - the third frame is the last frame of the third signal block.
- [c4] 4. The automatic gain control method of claim 1, wherein determining whether the first signal block is in the discontinuous transmission mode or not further comprises:
 - computing a first number of valid frames belonged to the first signal block;
 - comparing the first number with a predefined number;
 - determining that the first signal block is not in the discontinuous transmission mode.

continuous transmission mode if the first number is larger than or equal to the predefined number; and determining that the first signal block is in the discontinuous transmission mode if the first number is smaller than the predefined number.

- [c5] 5. The automatic gain control method of claim 4, wherein computing the first number of valid frames belonged to the first signal block further comprises:
 - estimating a signal quality metric for each frame belonged to the first signal block;
 - if a frame has a signal quality metric which is larger than a predefined quality metric, then regarding the frame as a valid frame; and
 - computing the first number of valid frames belonged to the first signal block.
- [c6] 6. The automatic gain control method of claim 5, wherein the signal quality metric is a signal-to-noise ratio of the frame belonged to the first signal block.
- [c7] 7. The automatic gain control method of claim 5, wherein the signal quality metric is a signal power level of the frame belonged to the first signal block.
- [c8] 8. The automatic gain control method of claim 1, wherein updating the gain value according to the power level of

the baseband signal corresponding to the first frame further comprises:

comparing the power level of the baseband signal corresponding to the first frame with a desired power level;

increasing the gain value if the power level of the baseband signal corresponding to the first frame is smaller than the desired power level; and

decreasing the gain value if the power level of the baseband signal corresponding to the first frame is not smaller than the desired power level.

[c9] 9. The automatic gain control method of claim 8, wherein the baseband signal corresponding to the first frame is an input signal of an analog-to-digital converter used in the wireless receiver.

[c10] 10. A wireless receiver for receiving a plurality of signal blocks sent by a wireless transmitter, each of the plurality of signal blocks comprising at least one frame, the wireless transmitter having a discontinuous transmission mode, the wireless receiver comprising:

an antenna for receiving a RF signal corresponding to a first frame of a first signal block sent by the wireless transmitter;

a receiver module connected to the antenna for amplifying the RF signal corresponding to the first frame with a gain value and down converting the RF signal to generate

a baseband signal;

a discontinuous transmission detection module connected to the receiver module for determining whether the first signal block is in the discontinuous transmission mode or not;

a gain control module connected to the receiver module and the discontinuous transmission detection module for adjusting the gain value used by the receiver module; wherein after receiving the first frame of the first signal block, the gain control module updates the gain value according to the power level of the baseband signal corresponding to the first frame; then the receiver module uses the updated gain value for amplifying the RF signal corresponding to a second frame when receiving the second frame; and if the discontinuous transmission detection module determines that the first signal block is in the discontinuous transmission mode, the gain control module resumes the gain value according to the power level of the baseband signal corresponding to a third frame that belongs to a third signal block sent before the first signal block and the third signal block is not in the discontinuous transmission mode.

[c11] 11. The wireless receiver of claim 10, wherein:

the wireless transmitter transmits the RF signal in a frequency hopping manner; and

the first frame, the second frame, and the third frame correspond to the same channel frequency.

- [c12] 12. The wireless receiver of claim 10, wherein:
 - the wireless transmitter transmits the RF signal with a single channel frequency;
 - the second frame is the one sent immediately after the first frame; and
 - the third frame is the last frame of the third signal block.
- [c13] 13. The wireless receiver of claim 10, wherein the discontinuous transmission detection module determines whether a first signal block is in the discontinuous transmission mode or not by comparing a first number with a predefined number; the first number corresponds to the number of valid frames belonged to the first signal block; if the first number is not smaller than the predefined number, then the discontinuous transmission detection module determines that the first signal block is not in the discontinuous transmission mode, otherwise the discontinuous transmission detection module determines that the first signal block is in the discontinuous transmission mode.
- [c14] 14. The wireless receiver of claim 13, wherein for computing the first number of valid frames belong to the first signal block, the discontinuous transmission detec-

tion module estimates a signal quality metric for each frame belonged to the first signal block; if a frame has a signal quality metric which is larger than a predefined quality metric, then the discontinuous transmission detection module regards the frame as a valid frame.

- [c15] 15. The wireless receiver of claim 14, wherein the signal quality metric is a signal-to-noise ratio of the frame belonged to the first signal block.
- [c16] 16. The wireless receiver of claim 14, wherein the signal quality metric is a signal power level of the frame belonged to the first signal block.
- [c17] 17. The wireless receiver of claim 10, wherein for updating the gain value according to the power level of the baseband signal corresponding to the first frame, the gain control module compares the power level of the baseband signal corresponding to the first frame with a desired power level, and increases the gain value if the power level of the baseband signal corresponding to the first frame is smaller than the desired power level, otherwise the gain control module decreases the gain value.
- [c18] 18. The wireless receiver of claim 10, wherein the wireless receiver further comprises an analog-to-digital converter for converting the baseband signal corresponding

to the first frame to a digital signal.

[c19] 19. An automatic gain control apparatus applied in a wireless receiver, the wireless receiver receiving a plurality of signal blocks sent by a wireless transmitter, each of the plurality of signal blocks comprising at least one frame, the wireless receiver having a receiver module for amplifying a received RF signal corresponding to a first frame with a gain value and down converting the RF signal to generate a baseband signal, the wireless transmitter having a discontinuous transmission mode, the apparatus comprising:

- a discontinuous transmission detection module connected to the receiver module for determining whether a first signal block is in the discontinuous transmission mode or not, wherein the first signal block contains the first frame;
- a gain control module connected to the receiver module and the discontinuous transmission detection module for adjusting the gain value used by the receiver module; wherein after receiving the first frame of the first signal block, the gain control module updates the gain value according to the power level of the baseband signal corresponding to the first frame; then the receiver module uses the updated gain value for amplifying the RF signal corresponding to a second frame when receiving the

second frame; and if the discontinuous transmission detection module determines that the first signal block is in the discontinuous transmission mode, the gain control module resumes the gain value according to the power level of the baseband signal corresponding to a third frame that belongs to a third signal block sent before the first signal block and the third signal block is not in the discontinuous transmission mode.

- [c20] 20. The automatic gain control apparatus of claim 19, wherein:
 - the wireless transmitter transmits the RF signal in a frequency hopping manner; and
 - the first frame, the second frame, and the third frame correspond to the same channel frequency.
- [c21] 21. The automatic gain control apparatus of claim 19, wherein:
 - the wireless transmitter transmits the RF signal with a single channel frequency;
 - the second frame is the one sent immediately after the first frame; and
 - the third frame is the last frame of the third signal block.
- [c22] 22. The automatic gain control apparatus of claim 19, wherein the discontinuous transmission detection module determines whether a first signal block is in the dis-

continuous transmission mode or not by comparing a first number with a predefined number; the first number corresponds to the number of valid frames belonged to the first signal block; if the first number is not smaller than the predefined number, then the discontinuous transmission detection module determines that the first signal block is not in the discontinuous transmission mode, otherwise the discontinuous transmission detection module determines that the first signal block is in the discontinuous transmission mode.

- [c23] 23. The automatic gain control apparatus of claim 22, wherein for computing the first number of valid frames belong to the first signal block, the discontinuous transmission detection module estimates a signal quality metric for each frame belonged to the first signal block; if a frame has a signal quality metric which is larger than a predefined quality metric, then the discontinuous transmission detection module regards the frame as a valid frame.
- [c24] 24. The automatic gain control apparatus of claim 23, wherein the signal quality metric is a signal-to-noise ratio of the frame belonged to the first signal block.
- [c25] 25. The automatic gain control apparatus of claim 23, wherein the signal quality metric is a signal power level

of the frame belonged to the first signal block.

- [c26] 26. The automatic gain control apparatus of claim 19, wherein for updating the gain value according to the power level of the baseband signal corresponding to the first frame, the gain control module compares the power level of the baseband signal corresponding to the first frame with a desired power level, and increases the gain value if the power level of the baseband signal corresponding to the first frame is smaller than the desired power level, otherwise the gain control module decreases the gain value.
- [c27] 27. The automatic gain control apparatus of claim 19, wherein the wireless receiver further comprises an analog-to-digital converter for converting the baseband signal corresponding to the first frame to a digital signal.